

A Snapshot of Inquiry Web Development 1

Running Head: A SNAPSHOT OF INQUIRY WEB DEVELOPMENT

Using the Web to Promote Inquiry and Collaboration:

A Snapshot of the Inquiry Page's Development

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Abstract

Inquiry-based learning strives to make learning more meaningful to the learner, however many classrooms provide little evidence of student inquiry. One reason for this is the lack of support for teachers interested in sustaining inquiry in their classrooms. The Inquiry Page, a cross-institutional and interdisciplinary web site, aims to support inquiry and collaboration by encouraging teachers to inquire, communicate, construct, and express themselves. By capturing a snapshot of the Inquiry Page's development process, this paper provides a model for educators interested in developing a collaborative web site. Activity theory guides the analysis and description of the inquiry community and development tools. To further our understanding of the web site's usefulness, we designed and conducted a focus group session. The results of the focus group not only suggest necessary improvements, but also validate our development process.

Using the Web to Promote Inquiry and Collaboration:

A Snapshot of the Inquiry Page's Development

Inquiry-based learning is the most recent manifestation of a centuries-old desire to make learning more meaningful to the learner, more transferable to situations beyond the specific context of learning, and more conducive to a lifelong continuation of learning. Its roots in the West go back at least to Socrates, and can be seen in various forms in the writings of Vygotsky, Piaget, and Dewey.

Dewey's (1956) insight that the "impulses" of the learner are the real foundation of the curriculum is more relevant today than it was when he first formulated it nearly a century ago. As the objects of learning become more complex and the applications more demanding, the notion that schooling is about the imparting of simple schemas for knowledge appears less and less tenable. In particular, the opportunities that new technologies afford, coupled with the challenges they imply, mean that learning must be conceived more explicitly, as it has always been in fact, as a process of constructing meaning out of ill-structured data. When learning is conceived in this way, it becomes clear that it occurs through a process in which the learner progressively expands on prior interests and knowledge to create new knowledge. As Dewey wrote much later in his life (Dewey & Bentley, 1949), educators need to understand knowing, rather than knowledge.

What then, are the interests of the learner? There are various formulations that one might give, but Dewey's (1956) original one has worked surprisingly well for a variety of learners and learning contexts, even though it appears he had in mind the youngest of schoolchildren. He emphasized the natural impulses to investigate, observe, and find out

things; to use language and thereby to enter into the social world; to build or make things; and to express one's feelings and ideas.

One application of Dewey's principles is inquiry-based instruction. Inquiry teaching methods emphasize students' knowledge construction rather than simple transmission, that call for active learning, and provide strategies for independent thinking. Inquiry-based instruction requires that teachers take an active role in inquiring about the processes of teaching and learning and using that knowledge to improve curriculum and instruction. Inquiry-based instructional methods emphasize users' knowledge construction rather than simple transmission, promote active learning, and provide strategies for independent thinking (Short et al., 1996).

There are close affinities between inquiry-based learning and other curricular philosophies or approaches, such as project-based learning, process instruction, learner-centered curriculum, and integrated curriculum. One might add to this long and notable philosophical tradition both the rich array of examples from progressive education, whole language, process writing, holistic learning, constructivist mathematics, and other movements, and also the recent official promotion of inquiry-based learning in various standards documents and systemic reform efforts. Nevertheless, many classrooms provide little evidence of real student inquiry. Often a visitor sees learning tasks that are entirely textbook-driven, concepts packaged in tiny bits, and little opportunity for students to engage with challenging materials or ideas.

There are many reasons for this disparity between the philosophical ideal and the enacted curriculum (Bruce, 1993; Labaree, 1995). Without delving into the question to

the degree it deserves, we might gloss the problem as the lack of organizational support for teachers to gain access to useful ideas, models, and materials, to share their findings and frustrations, and to connect their work as teachers with others. In short, there is little support for either successful practice or the continuous learning that inquiry-based learning requires.

Teachers who want to have their students participate in more open-ended forms of learning would benefit from improvements in many areas, including teacher preparation, assessment procedures, texts and materials, opportunities for mentoring and collaboration, and continued professional development. In addition, new technologies present intriguing possibilities for supplementing and extending work in these more traditional arenas.

The Inquiry Page

The Inquiry Page (IP, found at inquiry.uiuc.edu) is a web site for collaborative curriculum development (see Figure 1). Following Dewey's (1956) argument, the site supports a range of activities in which educators are encouraged to inquire, communicate, construct, and express themselves. Teachers inquire through their access to resources on teaching and learning, including articles, project links, curriculum units, and content resources. They communicate with other teachers through various online communication media. They construct their own versions of curricula using an online inquiry unit generator. They express themselves through these units and through sharing both literal and textual photos of their classrooms.

Figure 1. The IP

[Insert Figure 1 About Here]

The IP developed with the notion that learning occurs through a dialogic process of constructing meaning. This view of learning moves beyond memorization, recording, and storing information to the interpretation of phenomena, in short, to more inquiry-based instruction (Beyer, 1971; Donnan, 1988; Lansdown, 1971; Wells, 1995).

The purpose of this paper is to provide a snapshot of the IP's continuous evolution so other educators might learn about the complexities of developing interactive web pages. We are not reporting final conclusions in this paper because the IP is a dynamic page that is under development. Rather, the goal of this narrative is to share the inquiry cycle of the IP's developers and users.

The Development Process

To analyze and describe the development processes, a theoretical framework such as activity theory is helpful. Kuuti (1996) defines activity theory as a "philosophical and cross-disciplinary framework for studying different forms of human practices as development processes, with both individual and social levels interlinked at the same time" (p. 25). In activity theory, activities are under continuous change and development. However, development is not linear or straightforward, but is uneven and discontinuous. Such development matches the activity of developing the IP.

One key element of an activity development is considering the community that is involved. The community of IP developers and users has grown since first constructed three years ago in a graduate course on inquiry. It began as an extreme version of participatory design--the users were the developers (Clement & Van den Besselaar,

1993). As the semester ended, the IP broadened its community of users by incorporating the participants of Chickscope, a teacher professional development project. Since then, the IP has expanded its users by involving participants from other research and development projects.

Currently the inquiry development team (IDT), which consists of members from several university departments and schools, maintains the IP. This cross-institutional community is comprised of experts in technology, literacy, science, mathematics, educational psychology, and teacher education. Figure 2 shows the departments and projects involved.

Figure 2. The Inquiry Development Team Community

[Insert Figure 2 About Here]

The dynamics of the group change as people with different strengths and interests join the community. Many developers come from a variety of backgrounds, but are involved in other related projects. There are too many individuals on the IDT to describe every one in this article. But, the following descriptions offer a glimpse of how the diverse participants help shape the page. For example, the webmaster for Biology Workbench (<http://bioweb.ncsa.uiuc.edu/educwb/>) attends the meetings to share her perspectives on how the two projects connect. Another active participant is interested in how computers can improve the learning experience. He shares his experience from working on VisIT (<http://visit1.vp.uiuc.edu>), an interactive, graphical user interface in which users can "see" their Internet search results. Another participant is a graduate student in the Center for Writing Studies in the English Department at UIUC. She works

with the Distributed Knowledge Research Collaborative (DKRC--<http://dkrc.org>). In many ways the interests of the DKRC group and the Inquiry group merge, so some of her work for the DKRC also contributes to the IP. Our current webmaster is interested in information infrastructures for K-12 teachers. Her research centers on collaboratories where teachers can share ideas and resources and meet others interested in inquiry based teaching and learning.

Not only is each individual's expertise critical to the IDT, but the power of shared information also enhances the site. The IDT uses a variety of tools, including weekly meetings, e-mail listservs, computer software (Internet browsers, word processing software, e-mail programs, system software, etc.), funding from grants, research findings, resources from partnerships, and user feedback to develop the IP.

Figure 3. Development of the IP

[Insert Figure 3 About Here]

Figure 3 demonstrates the roles these tools play. Weekly meetings have helped sustain the page by committing the developers to a regular time and place for meeting and discussing issues. During our meetings, participants often cite research to inform our inquiry of refining the page. Members of the IDT provide copies of research materials for those who are interested in the topic. The IDT then discusses the materials at subsequent meetings. Our meetings also provide a time for potential partners to visit and present information about their project and participate in a discussion about how the IP might fit with their work. In addition to the weekly meetings members of the IDT attend

workshops, seminars, presentations, and open houses as other means for fostering partnerships.

Not only does the IDT hold regular face-to-face meetings, but it also discusses developmental concerns electronically on our listserv. The listserv discussions make developmental issues available to interested people who are unable to attend the meetings. One member posts minutes from the meeting so those who did not attend still have access to the topics of discussion. A recent topic of discussion has been the various uses of the Inquiry Units: as a format for telling the story of a unit, as the unit itself, and as a site for students to show their work.

Seeking and obtaining grants have also helped shape the IP. Previously, funding from a Committee Institutional Cooperation grant encouraged collaboration among students and faculty from Purdue University and University of Illinois. As the IDT reflects on how to meet more needs, it has sought funds to reach new goals.

Another way that the IDT improves the page is to incorporate software and programming advances. The first webmasters began the page using the most basic HTML to be sensitive to educators who were limited to text-based Internet browsers such as LYNX. As an increasing number of educators have access to increasing speed and bandwidth, the IDT has expanded how it presents information. Additionally, new tools have afforded the IDT efficiencies for updating the page.

User feedback has also refined the information delivery. The IDT has grappled with how to model inquiry as it promotes inquiry in teaching. Users provide specific

information on how the IDT can better communicate the inquiry process. A specific example of user feedback merits its own section.

Accessing User Feedback with Focus Groups

One constant theme among the IDT is what the IP's users want and need. According to activity theory, simply observing users is inadequate; developers must discover what the user is thinking to properly design an information system (Nardi, 1996). Accessing the users' thoughts is one of the IDT's challenges.

Researchers are increasingly using focus groups to investigate information use (Oberg & Easton, 1995). Focus groups are superior to individual interviews because participants can create a "synergy which results in more than the sum total of what individuals alone could create" (Lederman, 1990, p. 119). "The exchange of ideas in the group stimulates new thought which may never be mentioned in individual interviewing" (p. 120). This research convinced us that a focus group should be conducted to explore people's feelings, thoughts, and behaviors (Lederman, 1990) to assure that the IDT was correctly identifying the users' needs.

We designed and conducted the focus group process according to the approach advocated by Krueger (1998) and Morgan (1998). We especially wanted ideas from novice users of the IP, so we concluded that the focus group should consist of a representative sample of novices. Because the IP began with an inquiry course, the logical membership of the focus group was the current semester's inquiry students. Participants completed a written survey of personal information. Survey results indicated that there were five male and 15 female students enrolled in the course. They came from

several countries: China, Korea, Taiwan, and the United States and were working in education-related fields. A majority of them reported to use the Internet daily.

For the focus group phase, we followed Krueger (1998) and Morgan's (1998) recommendation that the moderator formulate the questions beforehand. We designed the questions and shared them with two other members of the IDT who were directly involved in the inquiry class. The moderator's script included the following questions: (a) What do you like about using the Internet? (b) When you hear the word inquiry, what comes to mind? (c) If you were talking with another educator, what would you say about this page? (d) What are the benefits of using the Inquiry Page? (e) What did you think about the process of entering in a unit? (f) If you were the web developer, what changes would you make to the Inquiry Page? (g) What is the page missing? (h) As we continue to develop the Inquiry Page, what advice do you have for us?

The focus group discussion lasted approximately one hour. We recorded the discussion on an audiotape so that we could review it later. We analyzed the focus group data using processes advocated by Krueger (1988). The grounded theory approach also informed our data analysis because data gathering and analysis are interwoven (Strauss & Corbin, 1990). This is important for developing the IP because, as the IDT gathers data, it can immediately analyze them in an ongoing manner. The feedback informs the quality of the web site, the uses of the IP, and the necessary improvements.

Internet Use

Focus group participants offered a wide-variety of viewpoints regarding various aspects of the IP. From the analysis, categories and concepts emerged. Specifically, we

found that this group of subjects used the Internet as a resource to gather information, receive services, and be entertained. Many of the participants discussed the benefits of researching the Internet to obtain product information and health updates. They also used the Internet for services such as downloading software, taking online courses, making travel arrangements, paying bills, and shopping for gifts. The discussion surrounding entertainment detailed how participants played games, communicated in chat rooms, watched television shows, read newspapers and journals, and listened to the radio on the Internet.

After analyzing these categories, it appeared that these connected to Dewey's (1956) impulses of the learner: Inquire, Communicate, Construct, and Express. See Table I for an elaboration of the Internet's uses. In our opinion, no data fit within the Express category because participants did not mention using the Internet to compose their own lessons, exhibit their art work, or any other means of expression that are possible online. Based on the lack of discussion on expression, it appears that the Internet is a provider for this group -- the users are receivers.

Table I. Elaboration of the Internet's Uses

[Insert Table I About Here]

The results show a dissonance between how these focus group participants report using the Internet and how the IDT envisions educators using the IP. First, one of the IP's main features is providing a database of lessons. During the data analysis, it became apparent that none of the subjects mentioned finding lesson plans as a use for the Internet. However, when we reported this data to the IDT, a visitor from ERIC shared that teachers

are constantly requesting lesson plans from their site. The IDT realized that the IP could not be limited to providing a database of lessons. However, providing lesson plans is meeting some educators' needs.

The data also confirmed that not all educators view the Internet as a means for expression. This group described their Internet use as primarily passive as these users typically engaged in one-way communication on the Internet. The IP provides a means for teachers to express themselves by sharing their inquiry lessons and stories. Though many teachers share their lessons on the page, there is still work to be done to engage more teachers in the sharing process. The IDT has jump-started this process by having participants in on going projects share their lessons. To build the IP's lesson plan database, more users will need to share their lesson plans. In addition, the IDT needs to devise ways to encourage other educators in the community to share their inquiry lessons.

This focus group was not intended to be representative of all educators who use the IP; however, the group sheds light on how some Internet users take advantage of web site offerings. This group especially helped the IDT consider how to shape the page to appeal to users who normally do not express themselves on the Internet.

Benefits of the IP

The focus group participants listed several benefits of using the IP. They stated that the IP was an "incredible resource." It is also a "great support for people trying to be more inquiry based." Another benefit of the page is that it recognizes teachers for doing inquiry-based lessons and gives teachers an avenue to publish their success. Participants couched some of the benefits in terms of the IP's potential. For example, one participant

stated, "As it grows--resources will be valuable because they were tried out." The expressed benefits of the IP are useful because they help the IDT see how this group of educators values the page. However, the primary purpose of the focus group was to help the IDT in improving the page.

Improving the IP

We asked the focus group participants how to improve the IP. The concepts that emerged included improvements associated with input, explanations, aesthetics, and usability.

Table II. Improvements That Need to Be Made

[Insert Table II About Here]

The most interesting finding was the suggestion that an area be added so users could respond to a published lesson. Although this group did not describe themselves as expressive, they were interested in the site providing a new area of expression--space for other educators to comment and reflect on posted lessons.

As the IDT has improved the page, it has striven to make the navigation as clear as possible, but the group noted a need for further improvements. The participants suggested detailing the steps so users know what lies ahead, defining words so users understand the terminology, and describing the inquiry process. The focus group also suggested aesthetic improvements. They suggested alternating pictures and assuring that the site looks the same with every Internet browser.

The data revealed that educators need more choices when they search so they can view lessons for several grades and subjects at once. Participants stressed the importance

of building the lesson plan database so more lessons are available. In addition, the IDT needs to check the lesson plan database to make sure that all lessons are complete.

Interestingly, all of the improvements that the focus group suggested are ideas that have been discussed during the IDT meetings (view our punch list <http://inquiry.uiuc.edu/develop/punch.php3>). These findings validate the inquiry community's improvement process of using the tools outlined in Figure 3.

Reflections

This article provides a snapshot of the inquiry process involved in developing a web site for educators. To tell the whole development story would be too long. It would also be inaccurate because the inquiry community is constantly expanding and changing the tools that it uses. We do not present this community as a model, but rather we share the insights it provides for educational web development.

The IP is more than the sum of its component parts. The development of the IP has led to the evolution of an information ecology. Nardi and O'Day (1999) defined an information ecology as a "system of people, practices, values, and technologies in a particular local environment" (p. 49). New ideas, tools, activities, and forms of expertise that arise in information ecologies help shape their evolution. In this information ecology, the IDT reflects about the components of the IP and how they may affect teachers' classroom use.

User feedback has been one of the essential tools that has helped develop the IP has been user feedback. A valuable method for accessing specific users' thoughts was

with focus group methodology. The focus group provided valuable evaluation data as well as an opportunity to interact with IP users face-to-face.

As we considered the data, it was important to recognize that this focus group was limited because it was not representative of all the IP users; it was essential to consider the results in a larger context. As we presented the data to the developers, we got additional information that added to our dialogue on improving the IP.


The IP is unique because it is not commercial, not a big archive of lessons, not institutional, but is self-sustaining. Generally, web sites are not places for people to contribute. They are typically a medium for readers. However, one-way communication is not an effective use of the Internet. The IP is also different because it is a medium for writers and creators; this page is a site for teachers to publish and share their work. The goal of the IP is to become a support for a community of inquiry (Robins, 1999). Developers and users are engaged in collaborative inquiry. Each participant asks different questions, contributes new knowledge, and learns from others. In this way, the participants constitute a community of innovation as well.

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Figure 1. The IP



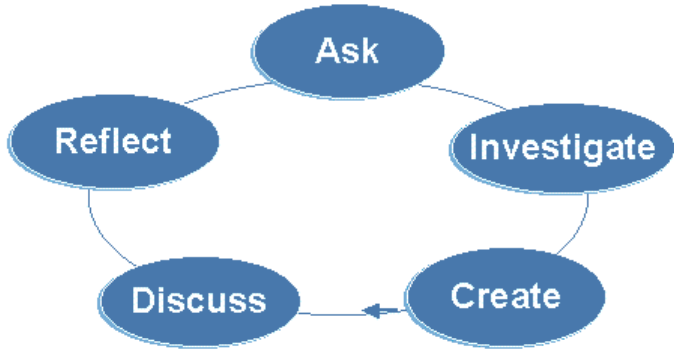
The Inquiry Page

Learning Begins with Questions



Home
Quote of the Day
Inquiry Units
Inquiry Partners
Links to Resources
Evaluation
Dialogues
About Inquiry Page

Welcome,
The Inquiry Page is a [community of innovation](#) where teachers discuss ways to extend the 'teachable moment' into teachable days, weeks, months, and years.



Questions and comments should be sent to chip@uiuc.edu.
Copyright (c) 1998, 1999, 2000 Inquiry Page Last updated: Jun 00

Figure 2. The Inquiry Development Team Community

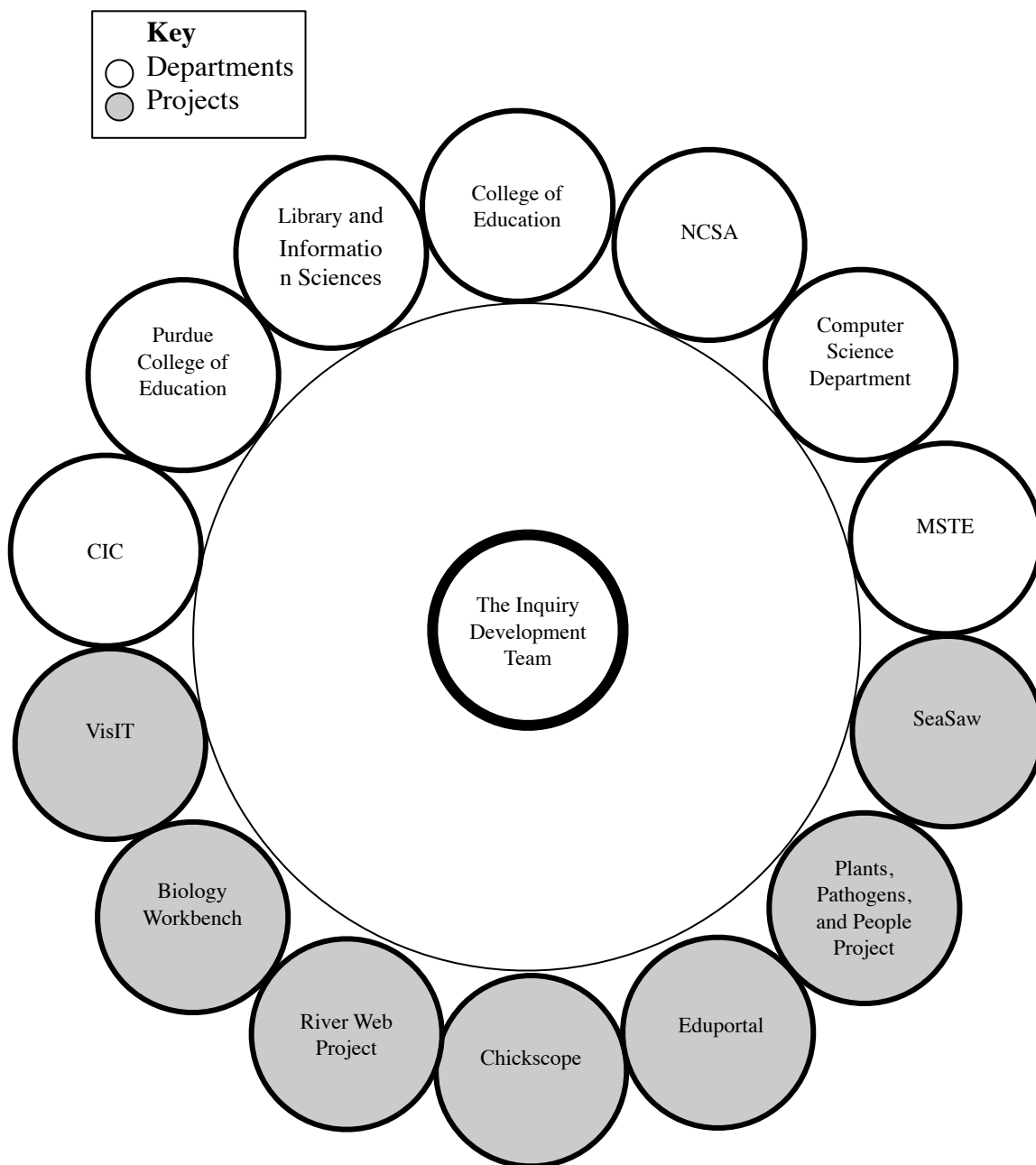


Figure 3. Development of the IP

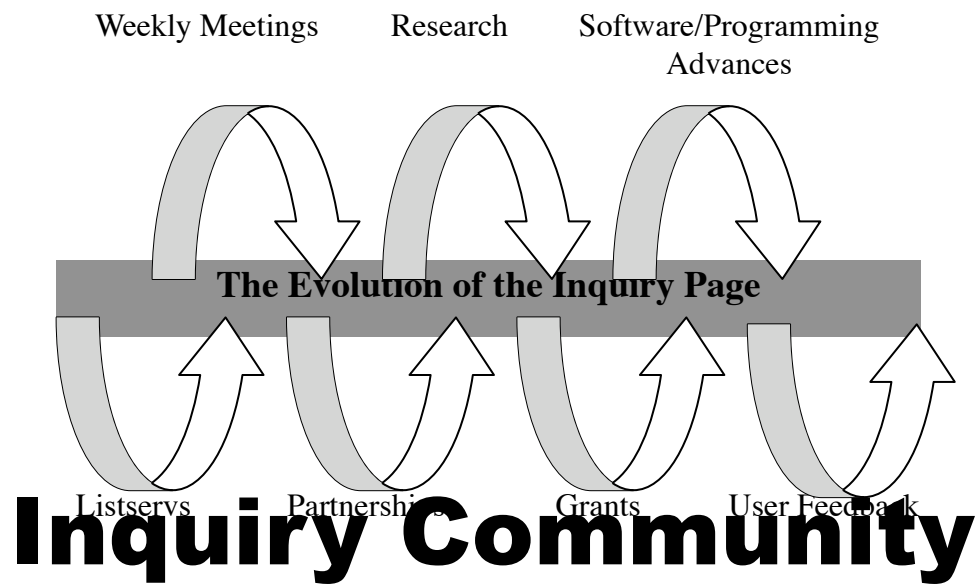


Table I. Elaboration of the Internet's Uses

Inquire	Communicate	Construct	Express
Researching stocks, software, products	Listening to the radio	Shopping for gifts	
Reading newspaper and journal articles	Playing games like Bridge	Making travel arrangements	
Getting updates on health information	Communicating in chat rooms	Paying bills	
Downloading software	Watching television shows from other countries		

Table II. Improvements That Need to Be Made

Input	Explanations	Aesthetics	Usability
Areas need to be added so users can respond to a lesson that is already in the database.	The "add a lesson" page needs to detail the steps so users know what lies ahead.	More than one picture should be on the site; try alternating pictures.	When searching for a lesson, users need to be able to select several grades and subjects at once.
	Definitions of words need to be provided throughout the page.	The first letter on the menu bar is missing when using Internet Explorer to view the page.	More lessons need to be available in the database.
	The inquiry process needs further description.		When a lesson is found through a search, it should be complete.